

Maximum temperatures and direction of the wind as registered by automatic instruments for each day of the period August 2-11, 1900.

[Wind directions are expressed in percentages.]

CHICAGO, ILL.

Date.	Max. temp.	Percentage of time wind blew from—								
		N.	NE.	E.	SE.	S.	SW.	W.	NW.	C.
2.....	77	4	29	6	6	12	33	7	3	
3.....	78		7	18	53	17	5			
4.....	94					42	48	10		
5.....	94				12	21	62	5		
6.....	93					32	66	2		
7.....	92					13	81	6		
8.....	91				1	7	76	16		
9.....	94					3	93	4		
10.....	94					5	91	4		
11.....	91	2				11	65	21	1	
Averages		0.6	3.6	2.4	7.4	16.3	62.0	7.5	0.4	

DETROIT, MICH.

Date.	Max. temp.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	C.
2.....	74	2	32	3		4	45	11	3	
3.....	78	23	15	34	5	12	10		1	
4.....	81		5	11	36	34	11	3		
5.....	94				1	26	59	14		
6.....	93					1	79	20		
7.....	92						75	25		
8.....	94						45	55		
9.....	90						56	44		
10.....	93						81	19		
11.....	93						75	25		
Averages		2.5	5.2	4.8	4.2	7.7	53.6	21.6	0.4	

Maximum temperatures and direction of the wind, etc.—Continued.

PITTSBURG, PA.

Date.	Max. temp.	Percentage of time wind blew from—								
		N.	NE.	E.	SE.	S.	SW.	W.	NW.	C.
2.....	78	9	10	12	18	2	6	7	46	
3.....	82	83	10						7	
4.....	85	38	17	16	8	2			19	
5.....	92	21	18	4	2	13	17	4	21	
6.....	97	13			8		6	21	51	6
7.....	95	20						1	79	
8.....	96	31							69	
9.....	96	21							79	
10.....	97	23							77	
11.....	98	33					4	20	43	
Averages		29.2	5.5	3.2	3.1	1.7	3.3	5.3	49.1	0.6

WASHINGTON, D. C.

Date.	Max. temp.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	C.
2.....	80	48							5	47
3.....	83	2	3	17	5				5	68
4.....	80	37	12	8	21				23	62
5.....	84				41	59				
6.....	96	1				46	13	38	2	
7.....	98		25					23	52	
8.....	96	1						30	69	
9.....	96	1						1	98	
10.....	97	4						4	87	5
11.....	101							38	62	
Averages		9.4	4.0	1.5	6.7	10.5	1.3	14.4	50.7	0.5

NOTES BY THE EDITOR.

WEATHER BUREAU MEN AS INSTRUCTORS.

It has long been evident that meteorology is but too slowly making its way into universities and colleges as an important branch of study. Some progress has been achieved in the public schools where meteorology is sometimes taught independently but more frequently as a branch of physics or as an essential part of physical geography. It has long been known that the Weather Bureau observers and officials have done all that they could do, consistently with other duties, to supply the demand for instruction and to dissipate the ignorance that prevails in many minds by reason of which meteorology has been associated with astrology, folklore, animal instinct, and other obscure, if not unscientific, fields of thought.

There is no better method of learning all that is known about a given subject than by undergoing the labor involved in preparing a lecture thereon, either for the public or for the college student. To do this successfully one must follow the Baconian rule, he must read in order to become full, he must write in order to become accurate, and must talk in order to become fluent. Of the many lines of work by which the members of the Weather Bureau service may benefit the service and the country, we put the ability to lecture and instruct in the front rank alongside of the ability to make better forecasts, or long-range forecasts, or to invent devices for prevention against damage by hail, frost, wind, and other meteorological elements.

The Editor conceives it to be quite important that the members of the service should stimulate each other in this good work. To this end he has compiled the following extensive collection of abstracts from both the annual reports of the respective stations and especially from the replies to a special circular letter of July 14, 1900. These abstracts are generally in the exact words of the original replies, the few changes that have been made being necessary only for greater perspicacity.

A.—EXTRACTS FROM LAST ANNUAL REPORT OF STATIONS.

P. Connor, Local Forecast Official, Kansas City, Mo.:

The subject of meteorology has been kept before the community quite prominently. The official in charge delivered a discourse before one of the high schools, and read a paper entitled: "The weather—something regarding its make up and effects," before the Commercial Club, at the solicitation of that body. Another paper was prepared (and approved by the Central Office) to be read before the Academy of Sciences toward the close of the year, but the absence from the city of several of the more prominent members, suggested the advisability of holding it for a future occasion.

The central high school has adopted meteorology in its curriculum, and made it one of the elective studies. The first class was formed during the winter and numbered about 25. Next year a large class is anticipated. The class and teacher have visited this office to see the practical side of the subject.

Maps and weather information generally have been eagerly sought by schools in Kansas and western Missouri, and many teachers from those States have visited this office.

S. W. Glenn, Local Forecast Official and Section Director, Huron, S. Dak.:

Informal lectures on the use of meteorological instruments and weather maps were given to the local high school class in physics, and by mutual understanding between the official in charge and the president of the State Agricultural College, the students of that institution visit the office singly and in numbers for instruction in meteorology.

T. B. Jennings, Section Director, Topeka, Kans.:

In February last I delivered an address, by invitation, before the Farmers' Institute at Berrytown, this county, on the United States Weather Bureau in its relation to agricultural interests.

In November, January, and March, I lectured before the teachers' association of this city, treating of the composition of the atmosphere, its changes in weight, temperature, and moisture, its general and accidental movements, instruments for measuring its weight, temperature, moisture, and movements, explanation of the instruments, the "photographing" the conditions twice daily by means of synchronous observations charted on maps, and the construction of such a map from a bulletin published in one of the Chicago dailies.

In June such a lecture was also delivered before the County Teachers' Institute at the High School Building.

In May a lecture on the atmosphere and the Weather Bureau instruments was delivered before the eighth grade in the Potwin School.

T. S. Outram, Section Director, Minneapolis, Minn.:

The public schools in the city, and in other parts of the State, continue to take an interest in the study of meteorology, and many of the teachers use the daily maps in their classes in physics and physical geography. In the summer school at the University of Minnesota, last July and August, a special study was made of the daily weather maps and the methods of using meteorological instruments.

A. F. Sims, Local Forecast Official, Albany, N. Y.:

The most important case in which the official records were used in the courts was a test case in the State court of claims. The official in charge was subpoenaed and took advantage of the opportunity offered to deliver an impromptu lecture on elementary meteorology to the judges of the State court, of which the Hon. Charles G. Saxton is president. Some time after the trial, Judge Saxton in conversation with me referred to my testimony before the board and expressed a desire to learn more of the modus operandi of the Weather Bureau. The case above referred to was worth \$100,000 to the State of New York.

By direction of the Chief of the United States Weather Bureau, and under the auspices of the State Board of Public Instruction, I lectured on elementary meteorology at the Teachers' Institutes held at Chautauqua, N. Y., and Thousand Island Park, N. Y.

During the winter months I lectured at the High School, Rensselaer, N. Y., also, before the Literary Association, Cooperstown, N. Y. The kindergarten work attracted general attention at home, and it is now at the Paris Exposition.

Questions in elementary meteorology are incorporated in the examination papers of the regents of the University of the State of New York.

Many classes from city schools, within a radius of 60 miles of Albany, visited the station during the year, and had the instruments explained. The Normal College interest in our work is very gratifying.

Mr. J. Warren Smith, Columbus, Ohio:

I continued the course in meteorology at the Ohio State University during the spring term of ten weeks, the lecture hours being at 4 p. m. on Tuesdays and Thursdays. At these hours this work takes but little time from the office hours, and I believe is not only of direct benefit to the university, but aids in raising the standing of the office and Bureau in the community. An official request has been made that the lectures be continued during the coming year.

At the request of the Secretary of the State Board of Agriculture the official in charge allowed his name to be listed with those from the executive force of the Ohio Agricultural Experiment Station and the Ohio State University as an available speaker at farmers' institutes. Fully half a dozen institutes were attended, four lectures were canceled because of my duty at the Central Office during February and March, and fully a dozen requests were not accepted because they came at a time when office duties would not admit of my absence. There seems to be an increasing interest among farmers in this State to know more of the work of the Bureau and to receive its benefits. Addresses were also given at the annual meetings of the State Board of Agriculture and the State Agricultural Society held at Columbus in January. That these addresses were well received is evidenced by the fact that two requests have been received to speak at grange picnics during the summer. At one the writer is on the program with the master of the National Grange, and at the other with the president of the Ohio State University.

Charles Stewart, Observer, Spokane, Wash.:

Three lectures were given by the observer in charge, two in the public schools, and the last at Gonzaga College, Spokane; it is believed these lectures were much appreciated.

Several times during the year teachers from the public schools, with their pupils, and the superintendent of kindergartens, with the class of young ladies studying to be kindergarten teachers, visited this office and were addressed by the observer in charge on meteorological instruments and kindred matters. Several times during the year other individuals have visited the office for the purpose of becoming acquainted with meteorological instruments.

B.—EXTRACTS FROM REPLIES TO CIRCULAR LETTER OF JULY 15, 1900.

R. G. Allen, Section Director, Ithaca, N. Y.:

Prof. R. S. Tarr gives a course in elementary meteorology two hours a week; one for recitation, the others for lectures, illustrating by lantern slides the weather map, and giving considerable attention to forest influences. This course is required of students in forestry, with others it is elective.

R. L. Anderson, Observer, Hannibal, Mo.:

Have explained the manner of recording meteorological observations to the pupils of the high school who have visited this office.

Wayland Bailey, Observer, Cedar City, Utah:

Three lectures were delivered before the public school children of this town. They were short talks on the work of the Weather Bureau and the movement of storms and clouds.

S. S. Bassler, Local Forecast Official, Cincinnati, Ohio:

Not any direct instruction in meteorology except occasional lectures and talks to night schools and special classes by myself. Instruction has, however, been given to classes or squads of students visiting the office. The subject is taught to some extent in the university and the city schools in connection with physics and physical geography. An effort will be made this year to have the subject introduced as a separate study in the university and all assistance possible will be offered.

J. W. Bauer, Section Director, Columbia, S. C.:

Have delivered two lectures in the high school of Columbia on this subject during the spring of 1898. Have also delivered a lecture on the same subject to the students of Columbia College, S. C., on March 23, 1900, and to the students of the Winthrop Normal and Industrial College, Rock Hill, S. C., on April 20, 1900.

Edward A. Beals, Forecast Official and Section Director, Portland, Oreg.:

No one at this station is now engaged in lecturing. I have been asked by the president of the University of Oregon, at Eugene, to give a lecture in the fall of 1900 upon explorations in the upper air by means of kites, and I have agreed to do so, provided I can obtain a leave of absence from the Chief of the Bureau for this purpose.

S. M. Blandford, Section Director, Boise, Idaho:

I have delivered occasional lectures in the common schools in this city. The lectures were general in character and principally explanatory of the work and aims of the Bureau. I have made arrangements with Prof. J. W. Daniels, Superintendent of Schools, to address the high school class semimonthly during the next school year. It is proposed to confine the lectures to meteorology and to require the pupils to furnish occasional essays.

J. P. Bolton, Observer, Fresno, Cal.:

It has been the practice at this station for some years to give a lecture to the physical geography class in the high school once a year. I have delivered the lectures referred to during the past four years. The scope of the instruction given has been chiefly confined to the law of storms, methods of forecasting, and the use of meteorological instruments.

E. H. Bowie, Observer, Dubuque, Iowa:

I have in the past been invited to give occasional lectures on meteorology before the students of the Dubuque High School, the Dubuque Teachers Institute, and to give one of a series of popular lectures before the Young Men's Christian Association. The lectures delivered have dealt with the construction and use of the different instruments employed in meteorology, a study of the weather map, the present and past methods of weather forecasting, and the climatology of the United States. In this connection I have to recommend a series of lecture charts, illustrating the movement of storms, the distribution of precipitation in the United States, and the extreme and annual mean temperatures, be prepared by the Central Office and issued to the stations for use in lecture work. In the past I have had to rely altogether on the blackboard for illustrations, and I have found it quite unsatisfactory.

Al. Brand, Observer, Atlantic City, N. J.:

The only effort along this line was a talk relative to the character of the work performed by the Weather Bureau, the instruments used in said work, and its aim toward serving the general public, delivered before the Women's Research Club of Atlantic City who visited this office by invitation on February 15, 1900. Several of the more advanced classes of our high school have also visited this office and been entertained in the same manner.

Allen Buell, Observer, San Antonio, Tex.:

There is no one engaged in lecturing. It is my purpose, however, to do something in that line the coming winter.

Ford A. Carpenter, Observer, San Diego, Cal.:

Occasional lectures and talks have been given during the past few years, as follows: Brief history of the weather service at the San Diego

State Normal School; the relation of the Weather Bureau to the public at the San Diego High School; outlines of the principles of meteorology at the National City High School and the climate of the State and city at the San Diego public schools. In some instances the lectures were in series in order to cover the subjects named. The above list does not include lectures and informal talks which I have delivered to the Chamber of Commerce, Board of Trade, the various local scientific societies, etc.

F. P. Chaffee, Section Director, Montgomery, Ala.:

No systematic course of instruction has been given, but I have lectured in the public schools in this city during the past year, as follows: March 7, Satre street Eighth grade School: subject, Winds and their causes. May 17, Girls' High School: subject, How we tell about the weather, being a general discussion of meteorology from a theoretical and practical standpoint, and an explanation of the method by which weather reports are now collected and forecasts made by the Weather Bureau.

It is my intention during the coming school year to make a more determined effort in the matter of instruction in meteorology in educational institutions in this city and vicinity, and if possible, to arrange for some systematic course of lectures on this subject in the public schools.

George M. Chappel, Local Forecast Official, Des Moines, Iowa:

I delivered a lecture at Highland Park College, Des Moines, in January, 1898, on the history of the weather service in the United States and the practical working of the service at that time, explaining and exhibiting the instruments and giving a brief outline of the method of taking observations and disseminating them throughout the country, also making a weather map and giving an explanation of it.

Isaac M. Cline, Local Forecast Official and Section Director, Galveston, Tex.:

I lectured once a week during the term in the department of medicine of the University of Texas. I inclose a page from the Catalogue of the University which shows the character and scope of the instruction. Instruction is given by systematic lectures. The course embraces briefly a description of instruments and methods; the origin of the atmosphere, etc. (See pages 31 and 32 of the Catalogue of the University of Texas.) Charts and diagrams are used where practicable to illustrate the more important features of the lecture. This course is given with a view to increasing the general interest in the work of the Bureau.

Norman B. Conger, Inspector and Marine Agent, Detroit, Mich.:

I have given two lectures, one at the High School at Lansing, Mich., and the other before the Detroit School for Boys, Detroit, Mich. Both of these were informal talks before the classes. I have given a series of lectures before farmers' institutes at different points in the State during the winter of 1890-91, and also in 1895, at Maybee, Mich., before farmers' institutes, and several lectures at Detroit, Mich., before the Shipmasters' Association, Lodge No. 7.

F. H. Clark, Observer, Binghamton, N. Y.:

Two years ago, I extended a general invitation to the teachers of the public schools of this city to visit the office with their pupils. This invitation has been taken advantage of by several teachers and their pupils on different occasions, when practical talks on meteorology and explanations of the weather map and instruction have been given.

Maurice Connell, Observer, Red Bluff, Cal.:

I have been in the habit of delivering occasional lectures to the pupils of the Red Bluff High School at each school term on meteorology and kindred subjects. Pupils of both high school and grammar school invariably visit my office at least once during school term, for the purpose of receiving practical lessons in meteorology. Many invitations are received by me from outside country schools to deliver lectures, but being alone on station I am compelled to decline all invitations outside of Red Bluff.

Thomas Crawford, Observer, Rapid City, S. Dak.:

No lectures of any kind have been given. I suggested to the superintendent of schools in this city a course of instruction in meteorology, and an explanation of the daily weather map, to be given in the high school once a week, but he gave me but little encouragement.

D. Cuthbertson, Local Forecast Official, Buffalo, N. Y.:

On several occasions lectures on the working of the Weather Bureau, its usefulness, etc., have been given in the public and high schools of this city. The office has been visited annually by the graduating classes of the public, normal, and high schools to obtain practical instruction in the use of instruments. A course of lectures on the use of the barometer, on the weather maps, and on the phenomena of storms on the lakes was given before the Shipmasters' Association.

R. H. Dean, Observer, La Crosse, Wis.:

No instruction has been given. It has been my intention to give some instruction in schools but until now the routine work has taken all my time. I hope to be able to give instruction to classes in the high school if it is agreeable to the officials.

Lee A. Denson, Observer, Meridian, Miss.:

The only instruction given by me has been the furnishing of the daily weather map and explaining the instruments, the process of map making and other points of general interest to the classes in physics and physical geography visiting this station from the East Mississippi Female College, the Moffet-McLaurin Institute, and the public high school all of this city.

H. P. Dick, Observer, Kalispell, Mont.

During the past six months the Washington issue of daily weather maps has been used by the schools in this place, and a limited number of scholars instructed at this office in the use of the several meteorological instruments comprising the equipment of a regular observing station.

S. L. Doshier, Observer, Hatteras, N. C.:

No instruction given at this station. Shortly before I left the Charlotte station I delivered a lecture on the subject of meteorology in the class room of the Young Men's Christian Association, for the benefit of the Association.

O. L. Fassig, Section Director, Baltimore, Md.:

I have held the position of instructor in meteorology in the Johns Hopkins University during the past two years. In this capacity a regular course of about twenty lectures concerning the general subject of meteorology and climatology has been delivered at the University. The course has become one of the required studies for graduate students in the geological department of the University.

The hearty cooperation established by order of the Secretary of Agriculture between the Weather Bureau and the Johns Hopkins University made it possible to carry to a successful issue an extended course on meteorology before the public school teachers of Baltimore. A class of about 80, including 6 university students, attended these lectures during January, February, and March of the present year. The course comprised 20 lectures, the scope of which, as well as the method of presentation, may be judged from outlines and diagrams already sent to the Chief of the Weather Bureau. The University has honored me by a renewal of my appointment as instructor in climatology.

F. J. Walz, Local Forecast Official and Section Director, Baltimore, Md.:

I have given occasional public talks on meteorology or the work of the Weather Bureau.

T. J. Considine, Observer, Erie, Pa.:

During the winter of 1898-99 I had under instruction in elementary meteorology a small class of young men, members of the educational branch of the Young Men's Christian Association; also occasional informal talks were given, at the request of the teachers, to the students of the class in physical geography at the Erie High School.

W. M. Fulton, Observer, Knoxville, Tenn. (Professor Fulton is a professor in the University of Tennessee):

An important branch of the work at this station is the course of lectures upon meteorology given by me at the University. This lecture course was inaugurated at the beginning of the spring term of the University in 1898. Since that time a growing interest has been manifested in this work by the student body. At the opening of the recent college session there was a decided increase in the number of applicants for admission to the course, and it is believed that this department is destined to become, if not one of the most largely patronized, one of the most useful departments in the University. When the course was first established in the University it was made an elective study, i. e., not required for graduation in any department in the University. It has recently been incorporated into the agricultural department, so that students in this department must complete the work in meteorology before diplomas can be granted them.

The course consists of three periods per week of one hour each, throughout the college year of nine months. One of these periods is devoted to a lecture, one to a quiz, and one to laboratory work, so that during the college year there are 34 lectures, 34 quizzes, and 34 laboratory exercises. Davis's Elementary Meteorology is used for parallel reading, and the book is completed during the year. Stereopticon illustrations, enlarged charts, and mimeographed notes, are used freely to illustrate and supplement lectures.¹ The students, as a whole, evince much interest in the subject, and do good work. A number of requests

¹ A nearly complete set of these notes is filed at the Central Office.—Ed.

to have the course extended have been received, but this is not thought advisable at present.

In addition to the above, the observer was requested to deliver a series of practical lectures in connection with a "short course in agriculture" which has been provided for by the Tennessee Agricultural Experiment Station during the winter months. This short course is designed to meet the needs of a large number of farmers, and farmers' sons, who can not afford to absent themselves from the farm at any other time in the year. Although the course was opened this year for the first time, the attendance was larger than was expected. The meteorological lectures were twelve in number, eight of which were devoted to a detailed discussion of the work of the Weather Bureau. They were well received.

By permission from the Chief of the Weather Bureau, the observer has been allowed to act as "meteorologist" of the Tennessee Agricultural Experiment Station since the beginning of the college year in 1899. This position carries with it no pecuniary reward, but it is thought that it will afford additional opportunity for advancing the interests of the service.

Public lectures have also been given from time to time during the year. Among these was one at Carson and Newman College, Mossy Creek, Tenn., and one each before two scientific organizations in Knoxville. Farmers' institutes have been attended at the following places: Boons Creek, Tenn.; Rogersville, Tenn.; Morristown, Tenn.; Jackson, Tenn.; Larimore, Ala.; and Griffin's schoolhouse, Tenn. The observer was given a prominent place on all programs at those institutes, and took an active part in the work. The work of the Weather Bureau was explained and discussed. Especial attention was given to the climate and crop service; cotton region service; cold wave and frost warnings, with some discussion of methods of protection from frost; weather and temperature forecasts and daily weather charts. The institutes, without exception, were well attended by intelligent, representative farmers. A decided interest was everywhere manifested in the presentations of the Weather Bureau work. In several instances the observer was requested to extend a unanimous vote of thanks to the Honorable Secretary of Agriculture and the Chief of the Weather Bureau, for having the work brought before the institutes. Question boxes contained many pertinent queries concerning all phases of the work. It was my endeavor to first explain the methods which the Bureau is employing to aid the farmer, and secondly, to furnish information that would enable him to derive the greatest benefit from the service. There was every indication that these two ends were accomplished.

Plans have been made for extending the lecture work during the ensuing year. Lectures will be given before the summer gatherings at Monteagle, Tenn., on July 9 and 10, 1900. Through cooperation between the local superintendent of education and the University of Tennessee, a well arranged course of lectures will be given by members of the University faculty in the public schools of Knoxville. A number of lectures upon meteorology will be included in this course.

While the lecture work outlined above is very onerous to the observer, coming as it does in addition to regular station duties, it undoubtedly redounds greatly to the interests of the service. By this means is accomplished the twofold end of offering to the public the practical benefits of the service, and at the same time, imparting information which will enable the individual to utilize these benefits to the best advantage. Further than this, it brings the work of the Weather Bureau to the attention of many people who can be reached in no other way. And of more importance still is the fact that our young men, while getting their college education, are having instilled into their minds the great scientific principles upon which the work of the Bureau is founded. The service is thus held up to them in a new light; it is raised from the plane of mere utilitarianism to the broad field of scientific progress, and there is added to it new dignity which commands new respect. The possibilities for future good which may accrue from this source alone are too broad and too far reaching for conjecture. Nor are evidences of appreciation wanting on the part of the public for this Weather Bureau extension work, if such it may be termed. These are to be seen at nearly every hand. In fact, if the limited experience at this station will justify any definite conclusions, it must be said that meteorological lectures, properly presented by the officials of the Weather Bureau in our educational institutions and before the public, add greatly to the public usefulness of the service, and help much to establish it firmly and permanently in the esteem of the people.

With regard to the lecture at Monteagle, Tenn., above referred to, Mr. Fulton reports:

These lectures were delivered on July 9 and 10 in the Auditorium, before the summer gathering of school teachers from all parts of the State. The first lecture was entitled "Scientific methods of observing the weather." In this lecture the field of observational meteorology was briefly reviewed. Stereopticon views of the various meteorological instruments were given, and the instruments were briefly explained and discussed in a popular way.

The second lecture was entitled "Scientific weather forecasting."

On this occasion a series of synoptic weather charts were presented upon the screen, showing the progress of a storm and a cold wave across the United States, with the weather changes accompanying each. Then followed photographs of lightning, tornadoes, clouds, etc.; a popular discussion accompanied the views.

In both lectures, the methods employed in the Weather Bureau served as a nucleus about which additional matter was grouped.

There were about 1,500 people on the grounds at the time the lectures were given, many of whom were teachers from Tennessee and neighboring States. Of those on the grounds, about 800 were present at the first lecture and about 1,000 at the second. The audiences seemed to be interested in the subjects presented, and the lectures were well received.

George E. Franklin, Local Forecast Official, Los Angeles, Cal.:

As yet no systematic course has been undertaken, but during the winter season classes from the schools visit this station, while engaged in the study of physical geography and physics, to obtain an insight into applied meteorology. The information given practically amounts to lectures or instructions in meteorology, and is not only appreciated but is of much assistance to the pupils.

It is proposed during the winter to prepare articles on meteorology and the practical workings of a Weather Bureau station for public reading, and, as a preliminary, Mr. Fuller, Observer, Weather Bureau, will read a paper on the daily weather map at Long Beach during August.

E. J. Glass, Section Director, Helena, Mont.:

Occasionally classes from the high school or other educational institutions visit the office of the Weather Bureau to examine and inquire into the workings of the various instruments. To all such persons as much time is given as the work of the office will permit.

S. W. Glenn, Local Forecast Official and Section Director, Huron, S. Dak.:

The official in charge gave informal instruction to the local high school class in physics last winter, the class coming to the office for the purpose, but the instruction covered only a description of the instruments, the manner of preparing weather maps, the movement of areas of high and low pressure, and the practical use that might be made of the maps for educational purposes.

R. Q. Grant, Observer, Lexington, Ky.:

Beginning August 1 next, I shall take up systematic instruction in meteorology in the Kentucky State College, a number of students desiring to pursue its study during vacation. Waldo's Elementary Meteorology will be used as a text-book, but will not be adhered to in the recitation. An outline of the subsequent lesson will be furnished each pupil that he may be aided in obtaining information from other sources. The general scheme as presented by Prof. Wm. H. Brewer of Yale College in the April number of the MONTHLY WEATHER REVIEW, will be followed with probably greater attention to detail than would be afforded in the thirteen lectures which his scheme is intended to cover.

A. E. Hackett, Section Director, Columbia, Mo.:

At the present time no instruction in meteorology is being given. During the past two years meteorology has been taught in the State University by one of the members of the faculty, and the students of the University, and also those of the various academies and colleges located here frequently visit this office, either individually or in classes, and upon such occasions I am frequently requested to explain various meteorological phenomena. I have also delivered lectures occasionally before physical geography classes in the Columbia Normal Academy, and before teachers' institutes.

George Hass-Hagen, Observer, Tampa, Fla.:

I have occasionally given talks on meteorology and Weather Bureau work to high school classes, but have never attempted anything further on account of a weak voice and catarrhal trouble.

J. S. Hazen, Observer, Springfield, Mo.:

I gave an address on the history, growth, and work of the Weather Bureau, as one of a series of popular talks on popular subjects which was inaugurated by the Young Men's Christian Association in connection with a night school last winter. The occasion was well advertised, and a large number of teachers and students attended. The talk was followed by a blackboard illustration of cyclonic movement as illustrated by the daily weather map.

A talk conforming in part to the above was recently given at the request of President Fuller, of Drury College, before a large body of teachers who are attending the Drury Summer School. Practically the same ground was also covered in an address before a class from the normal school, and also before the physical geography class in the high school during the past winter.

R. J. Hyatt, Local Forecast Official, St. Louis, Mo.:

No lectures on meteorology have been delivered to schools at this station.

The official in charge delivered two lectures to young men's clubs some time ago. The scope of the lectures embraced the explanation of the weather maps, movement of storms and cold waves, and a description of the meteorological instruments in use by the Weather Bureau.

James Kenealy, Local Forecast Official, Cleveland, Ohio:

Within the past year I have accepted invitations on two or three occasions to attend meetings of literary societies and give a description of the work of the Bureau; how foreknowledge of the weather is acquired, what instruments the office is equipped with, etc. Mr. H. G. Todd has also delivered an address on the climatic conditions of the United States before the local Chautauqua circle, of which he is a member.

C. W. Ling, Observer, Havre, Mont.:

On January 17 last, I delivered a lecture to the pupils of the grammar school, Havre, Mont.

G. A. Loveland, Section Director, Lincoln, Nebr.:

At the request of the regents of the University of Nebraska, I am preparing a series of thirty-five lectures on meteorology to be used, in connection with text-books, in giving instruction to a class in meteorology in the University, commencing next September and meeting once a week during the school year. It is my purpose to take up the subject as completely as the time and my knowledge of meteorology will allow.

Alexander G. McAdie, Forecast Official, San Francisco, Cal.:

I am, by the action of the board of regents, honorary lecturer in meteorology in the University of California. Four lectures were delivered last year, and this year a course of lectures will be offered, based upon the course outlined by Professor Abbe in the MONTHLY WEATHER REVIEW for September, 1899. I am very anxious to inaugurate this work at the University of California. My official duties, however, are such that but little time remains to me for this work and every course of lectures proposed will be accompanied with a proviso that official exigencies may prevent its delivery. May I suggest that a few reprints of the course referred to above be furnished to this office?

J. B. Marbury, Local Forecast Official, Atlanta, Ga.:

During the spring term of 1900 a class of boys from the high school of this city was brought to the office on several occasions for the purpose of obtaining information as to the various instruments used, etc. On these occasions short talks were given setting forth the construction and use of the instruments used, the methods of their practical use, and the methods of making the daily weather maps, forecasts, etc. Considerable interest was aroused in this way and it is more than probable that I shall make several talks before the boys' high school during the coming year. There are no colleges or universities here except negro institutions.

A. J. Mitchell, Section Director, Jacksonville, Fla.:

Arrangements have been perfected for me to deliver several lectures during the coming fall term at the State Agricultural and Mechanic College, Lake City, Fla. The trustees desired that there should be weekly lectures, but the Chief of the Bureau decided that it would be impracticable, owing to pressing station duties.

E. H. Nimmo, Observer, Evansville, Ind.:

On various occasions I have entertained classes at this office from the Evansville schools by showing and explaining to them the workings of the instruments in use and the work of the Weather Bureau generally.

B. S. Pague, Local Forecast Official, Detroit, Mich.:

Upon one occasion I delivered an address before an educational club of one of the Methodist churches of this city when I briefly outlined the Weather Bureau and its work.

W. S. Palmer, Section Director, Cheyenne, Wyo.:

In May, 1899, I delivered a lecture before the Cheyenne High School on Storms and Weather Forecasting, but have given no special lecture or instruction since that date.

Orin Parker, Observer, Rochester, N. Y.:

Beyond a couple of lectures delivered some time ago by myself, no one at this station is engaged in work of this character.

L. M. Pindell, Observer, Chattanooga, Tenn.:

Occasionally I am requested to deliver a talk on my work before a

class or school. The only talk or lecture given by me during the past year was on March 22d, on the Weather Map, before the graduating class of the Highland Park High School.

U. G. Pursell, Observer, Sioux City, Iowa:

No lectures have been given by myself or assistant, but occasionally teachers have come to this office for instruction, which they in turn gave to their classes. I have encouraged such visits and have supplied teachers in neighboring towns with all the printed information at my command, in explanation of the weather maps and meteorology.

George Reeder, Observer, Corpus Christi, Tex.:

During the winter of 1899-1900, I gave occasional short lectures in my office to the teachers of the Corpus Christi High School. These lectures covered the following subjects in the order named: I. The Atmosphere. II. Pressure, the barometer. III. Temperature, the thermometer. IV. Winds, the anemometer. V. Cyclones and anticyclones. VI. The Daily Weather Chart. These short lectures, given after office hours, were most favorably received. In fact, Professor Crossley was so favorably impressed that he has requested that I give the lectures in the school during the coming winter of 1900-1901.

H. W. Richardson, Local Forecast Official, Duluth, Minn.:

I have given a few lectures or addresses to high school classes and teachers attending normal and summer schools in Duluth. These lectures were general in character, combining such subjects as the work of the Weather Bureau; instrumental equipment; observations; forecasts, and meteorology in a single lecture.

While stationed at Columbus, Ohio, I delivered several addresses of this character at farmers' institutes, the Engineers' Club, the Board of Trade, and the Ohio State University. A systematic series of lectures was in course of preparation for use at the Ohio State University, but my transfer to Duluth caused an abandonment of the plan so far as I was concerned. Routine duties at the Duluth station prevent systematic work in this line, but lectures of a general character will be given as occasion requires.

Frank Ridgway, Local Forecast Official, Pittsburg, Pa.:

I have frequently invited to the office instructors of the educational institutions of this vicinity who have brought many of their students, to whom I have given such instruction, information, and data as were available. Students and other individuals interested in meteorological studies make frequent visits to the office in quest of information pertaining to the study of the weather maps which are furnished to the schools for that purpose.

John R. Sage, Section Director, Des Moines, Iowa:

Within the past few years I have given one lecture at each of the following institutions: Drake University, Des Moines, Iowa; the Highland Park College, Des Moines, Iowa; Capital City Commercial College, Des Moines, Iowa; State Agricultural College, Ames, Iowa. The principal subjects have been: The general work of the Weather Bureau in its relation to agriculture and also phenomenal storms.

I have also delivered lectures to a large number of farmers' institutes in different counties in this State, using the same general subject.

G. N. Salisbury, Section Director, Seattle, Wash.:

Occasional talks on the work and methods of the Bureau have been given to high school classes in physical geography when they have visited this office. An attempt will be made to interest the faculty of the State University in the subject the coming year. It is one in which no interest has been manifested by that institution.

C. F. Schneider, Section Director, Lansing, Mich.:

I have always taken the high school class in physical geography during the spring term for about a week and given lectures of about half an hour duration on practical meteorology. The lectures were talks regarding the organization and equipment of a regular Weather Bureau station, the making of a weather map, and the use of the same in forecasting.

Geo. W. Scott, Observer, Lander, Wyo.:

I have not been invited to speak upon our work since leaving Yankton in 1894; shortly before leaving that place, I gave a talk upon storms before the physics class in Yankton College. The principal of Lander public schools has several times sent his class in philosophy to my office to have the barometer explained, which explanation is always cheerfully given.

L. G. Schultz, Observer, Fort Worth, Tex.:

The duties at this station will not permit of giving instruction in meteorology in institutions of learning. Several invitations to lecture before the summer normals for teachers, in this and the neighboring counties have been declined; but weather maps and meteorological data

are furnished such gatherings for class-room work, and every assistance is given by letter to the instructors conducting the courses in meteorology and physical geography.

W. A. Shaw, Observer, Northfield, Vt.:

For the past four years, during the winter term, I have given a course of ten lectures in elementary meteorology to the members of the senior class of Norwich University. The course is based upon the works of Ferrel, Davis, Waldo, and J. W. Moore, and includes, briefly, history of meteorology; the atmosphere; temperature; pressure; winds; precipitation; atmospheric optics; general and secondary circulation of the atmosphere; climate; weather; forecasting. Waldo's Elementary Meteorology is used as a text-book.

J. P. Slaughter, Observer, Pueblo, Colo.:

There are neither universities nor colleges in this city. The city high school gives no instruction in meteorology further than a limited course in physical geography. During the past four years I have lectured twice before the Teachers Institute and three times before the students of the high school. These lectures have been discussions of the practical working of the Bureau, forecasting, distribution of warnings and their utility rather than an explanation of the principles of meteorology as a science.

J. Warren Smith, Section Director, Columbus, Ohio:

I gave a course, covering twenty hours, at the Ohio State University during the spring term of 1899, and again in 1900. The text-book used was Davis's Elementary Meteorology, supplemented by the daily weather map, and the work done during the term was divided up into illustrated lectures, recitation and laboratory work, or practise in chart making, and in handling the instruments. The subject has been given a regular place in the third year in the Agricultural College, it is required of the students in agriculture and horticulture and is elective in other departments. The work is given at 4 p. m., Tuesdays and Thursdays, during the spring term of ten weeks.

P. H. Smyth, Observer, Cairo, Ill.:

Last winter I was requested by a member of the school board, and also by the principal of the high school, to lecture at the high school, and consented to do so; but the practise of weekly lectures was discontinued.

Charles Stewart, Observer, Spokane, Wash.:

Since resuming charge of this station I have given several occasional lectures, four in number in Spokane, three in the public schools, and one at Gonzaga College. The lecture at Gonzaga College was to the faculty and advanced students; the subject, Weather changes and their causes, touching upon forecasting and work of the Weather Bureau. The lecture was illustrated by means of four large charts, prepared at this office, showing ideal cyclonic and anticyclonic areas, with their respective systems of isotherms, winds, etc.; and types of winter and summer maps. This lecture seemed to very much interest those who heard it, and the lecturer was invited to come again and lecture at the college.

The addresses to the public schools were similar to the lecture given at the college, only of more superficial nature. It is my intention, when the present vacation of the educational institutions at this place is closed, to lecture in the interests of the service, as well as in the interests of the public, whenever time and opportunity permit.

O. D. Stewart, Observer, Grand Junction, Colo.:

During May, 1899, I gave an address at the Teller Institute (United States Government Indian School), near this place, on the work of the Weather Bureau. The address was necessarily elementary in character. That it was appreciated was evidenced by the intelligent questions asked by the pupils.

L. M. Tarr, Observer, New Haven, Conn.:

Classes from Yale University, Giles Grammar School, high school, and also many teachers have visited the office and been instructed in the use of the instruments and the work of the Bureau, but no systematic course of instruction has been given.

E. C. Thompson, Sandusky, Ohio:

In May I gave a talk before the teachers of Sandusky, giving a short history of the service, what it is doing, and how it is doing it.

T. F. Townsend, Section Director, Philadelphia, Pa.:

Since my assignment at the Bourse I have given the public informal talks and descriptions of the meteorological instruments of the Bureau and their uses. During the coming school term teachers and their classes will be invited to visit the Bourse exhibit for the purpose of receiving instruction in meteorology.

E. C. Vose, Section Director, Parkersburg, W. Va.:

I give occasional talks as occasion may require.

C. F. R. Wappenhans, Local Forecast Official, Indianapolis, Ind.:

It has been a common occurrence for quite a number of years, during the winter, for teachers in public schools, the high school, or the industrial school to bring their classes occasionally to the office for instruction on the instruments and their use, on theoretical and practical meteorology, drawing of maps, forecasting, etc. Last winter I lectured on similar subjects at the Indiana College of Medicine, and I read a lengthy paper at the Indianapolis Literary Club on the history and development of the Weather Bureau, its work in detail, on theoretical and practical meteorology, forecasting and dissemination of forecasts or warnings of any kind and the statistics collected by the Weather Bureau.

Lucius A. Welsh, Local Forecast Official, Omaha, Nebr.:

No systematic course of lectures has been given, but, as stated in my annual report for the fiscal year ending June 30, 1900, a large number of classes in the city schools visited the office during the school year and were instructed in the work of the Bureau. The preparation and purpose of the daily weather map was fully explained, and a short lecture on the general movement of storms in the United States was given.

Very great interest was shown by the pupils in the work of the Weather Bureau, and I have been urged by the principals of the different schools to visit the schools and give them a talk on meteorology and the Weather Bureau. It is expected that this will be done during the coming winter, in which case, the Central Office will be informed in a special report, as directed.

G. N. Wilson, Observer, Lynchburg, Va.:

No work of this character has been done at this station. During my service at the Baltimore station I assisted Dr. C. P. Cronk for a short time with a class at the Johns Hopkins. This instruction consisted principally of explanations of the weather map and the use of the different Weather Bureau instruments.

George B. Wurtz, Observer, Escanaba, Mich.:

Last winter I delivered one lecture before the high school on The use of the weather map. The preceding winter I delivered seven lectures of an hour each before the same school. A simple exposition of the main features of meteorology was given in this course, closing with illustrations of the practical use of the reports in this vicinity.

Of course there are some stations at which the demands upon the Bureau are so severe that the Chief has been obliged to dissuade the employees from attempting any outside work. At some of our largest stations, located in the midst of active commercial interests, the schools and universities in the residential portions of the cities are so far away that lectures or instruction are impracticable. These stations, representing many of our best men, as well as those other stations located in regions of sparse population, where there is no opportunity to give instruction to classes are all included in the following list of stations at which no lectures or other instruction in meteorology are reported to have been given, viz: Abilene, Tex.; Alpena, Mich.; Augusta, Ga.; Baker City, Oreg.; Bas-seterre, St. Kitts, W. I.; Birmingham, Ala.; Bismarck, N. Dak.; Block Island, R. I.; Boston, Mass.; Cape Henry, Va.; Cape May, N. J.; Carson City, Nev.; Chicago, Ill.; Cienfuegos, Cuba; Concordia, Kans.; Davenport, Iowa; Denver, Colo.; Dodge, Kans.; Eastport, Me.; Elkins, W. Va.; El Paso, Tex.; Eureka, Cal.; Fort Smith, Ark.; Green Bay, Wis.; Harrisburg, Pa.; Havana, Cuba; Jupiter, Fla.; Keokuk, Iowa; Key West, Fla.; Kittyhawk, N. C.; Little Rock, Ark.; Louisville, Ky.; Macon, Ga.; Marquette, Mich.; Memphis, Tenn.; Milwaukee, Wis.; Mobile, Ala.; Nantucket, Mass.; Narragansett Pier, R. I.; Nashville, Tenn.; Neah Wash.; New Brunswick, N. J.; New Orleans, La.; New York, N. Y.; Norfolk, Va.; North Platte, Nebr.; Oklahoma, Okla.; Oswego, N. Y.; Palestine, Tex.; Pensacola, Fla.; Phenix, Ariz.; Philadelphia, Pa.; Pierre, S. Dak.; Pocatello, Idaho; Port Crescent, Wash.; Port Huron, Mich.; Portland,

Me.; Puerto Principe, Cuba; Raleigh, N. C.; Richmond, Va.; Roseburg, Oreg.; Sacramento, Cal.; St. Paul, Minn.; Santa Fe, N. Mex.; Santiago de Cuba, W. I.; Savannah, Ga.; Scranton, Pa.; Shreveport, La.; Springfield, Ill.; Tacoma, Wash.; Toledo, Ohio; Valentine, Nebr.; Walla Walla, Wash.; Wiliston, N. Dak.; Wilmington, N. C.; Winnemucca, Nev.; Port of Spain, Trinidad; San Juan, P. R.; Currituck Inlet, N. C.; Roseau, Dominica, W. I.; Mount Tamalpais, Cal.; Astoria, Oreg.; Tacoma, Wash.; Yuma, Ariz.; Wichita, Kans.; Salt Lake City, Utah; Flagstaff, Ariz.; Amarillo, Tex.; Independence, Cal.; Point Reyes Light, Cal.; Miles City, Mont.; Twin, Wash.; Bridgetown, Barbados; Lewiston, Idaho; East Clallam, Wash.; Kingston, Jamaica.

The following stations report simply that explanations and instruction have been given to schools or visitors at the office of the observer:

R. L. Anderson, Observer, Hanover, Mo.; F. H. Clarke, Observer, Binghamton, N. Y.; Lee A. Denson, Observer, Meridian, Miss.; H. P. Dick, Observer, Kalispell, Mont.; George E. Franklin, Local Forecast Official, Los Angeles, Cal.; E. J. Glass, Section Director, Helena, Mont.; H. W. Grasse, Observer, Moorhead, Minn.; J. B. Marbury, Local Forecast Official, Atlanta, Ga.; E. H. Nimmo, Observer, Evansville, Ind.; U. G. Pursell, Observer, Sioux City, Iowa; Frank Ridgway, Local Forecast Official, Pittsburg, Pa.; G. N. Salisbury, Section Director, Seattle, Wash.; L. G. Schultz, Observer, Fort Worth, Tex.; L. M. Tarr, Observer, New Haven, Conn.; T. F. Townsend, Section Director, Philadelphia, Pa.; Lucius A. Welsh, Local Forecast Official, Omaha, Neb.; Alexander G. Burns, Observer, Sault Ste. Marie, Mich.; George W. Felger, Observer, Grand Haven, Mich.

Among those who report themselves as preparing to do more in the immediate future at schools, colleges, or universities, are the following:

R. G. Allen, Section Director, Ithaca, N. Y., where Prof. R. S. Tarr, of Cornell, gives his well known course in elementary meteorology two hours each week, and which students in forestry are required to attend; Edward A. Beals, Forecast Official and Section Director, Portland, Oreg., who will lecture on kite work at the University of Oregon; Allen Buell, Observer, San Antonio, Tex.; Thomas Crawford, Observer, Rapid City, S. Dak.; R. H. Dean, Observer, La Crosse, Wis.; George E. Franklin, Local Forecast Official, Los Angeles, Cal.; R. Q. Grant, Observer, Lexington, Ky.; G. A. Loveland, Section Director, Lincoln, Nebr.; A. J. Mitchell, Section Director, Jacksonville, Fla.; Orris W. Roberts, Observer, Yankton, S. Dak.; G. N. Salisbury, Section Director, Seattle, Wash.; P. H. Smyth, Observer, Cairo, Ill.; T. F. Townsend, Section Director, Philadelphia, Pa.; L. A. Welsh, Local Forecast Official, Omaha, Nebr.; A. G. McAdie, Forecast Official, San Francisco, Cal., who will lecture in the University of California; G. Reeder, Observer, Corpus Christi, Tex., who will lecture in the high school at that place.

Finally, the reports from fifteen stations are especially worthy of consideration. It appears that Messrs. A. F. Sims, Albany, N. Y.; O. L. Fassig, Baltimore, Md.; J. Warren Smith, Columbus, Ohio; T. B. Jennings, Topeka, Kans.; I. M. Cline, Galveston, Tex.; D. Cuthbertson, Buffalo, N. Y.; W. M. Fulton, Knoxville, Tenn.; R. Q. Grant, Lexington, Ky.; G. A. Loveland, Lincoln, Nebr.; A. G. McAdie, San Francisco, Cal.; George Reeder, Corpus Christi, Tex.; H. W. Richardson, Duluth, Minn., and Columbus, Ohio; W. A. Shaw, Northfield, Vt.; C. F. R. Wappenhans, Indianapolis, Ind., and possibly others, have delivered, or prepared to deliver, extended courses of instruction in meteorology, embracing from ten to forty lectures, and from one to five months of time to classes in normal schools, academies, colleges or universities. It is apparent from this that there are among the officials of the Weather Bureau some whose enthusiasm, taste,

and talent fit them for success in lecturing and teaching. If any college or university desires a special course of instruction in meteorology its attention would naturally be directed toward the above names, although doubtless many other men in the service will also show themselves qualified for such positions.

It has always been recognized that the utility, and sometimes even the very existence of the Weather Bureau, has depended upon the appreciation of the fact that meteorology is a branch of modern physical science. During the past thirty years there has been a campaign of instruction in this respect, and the work must necessarily go on for generations to come. Probably it would assist many of our observers to prepare lectures if they could have a reprint in one bulletin of the outlines of the courses of lectures already prepared by Messrs. O. L. Fassig, J. Warren Smith, I. M. Cline, W. M. Fulton, G. A. Loveland, A. G. McAdie, G. W. Shaw, T. B. Jennings, and perhaps others who have prepared such courses. The variety of treatment of the subject by these different individuals has undoubtedly been suggested by the peculiarities of climate, agriculture, and education in their respective localities, and their course of lectures will, therefore, offer something of the variety needed by other men in the service in preparing their own lectures. It is to be hoped that each lecturer will print or offer for printing a complete synopsis of his course so that other lecturers may profit by examining them.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS.

The great desire for so-called long range predictions of climatic conditions, which in India is admirably responded to by the predictions of monsoon rains, can not, as yet, be gratified in a satisfactory manner for the United States, although it seems likely that we shall be able to do this before many years pass by. Meantime, in response to a popular demand, Professor Garriott, as Chief of the Forecast Division, has begun the preparation, for official publication, of a series of monthly statements of conditions observed during past years. The statement for August was published at the end of July, and is reprinted below.

This is not a weather prediction or forecast properly so-called, it simply tells us the averages and extremes that have occurred in past years, and leaves us to infer that probably something of the kind will happen during the present season. The individual months of the same name in successive years differ among themselves so much as to rainfall, temperature, cloudiness, and wind, that the average of a long series does not represent any one month, and in fact, is not that which is most likely to occur. A true prediction for a coming month must be based upon the study of the maps for the preceding six months, and must include the probable variations from the normal. In the absence of such precise predictions one may certainly draw some profit from a knowledge of the facts contained in these general statements.

AUGUST WEATHER.

STATEMENTS BASED ON CONDITIONS DETERMINED BY LONG OBSERVATION.

The following statements are based on average weather conditions for August, as determined by long series of observations. As the weather of any given August does not conform strictly to the average conditions the statements can not be considered as forecasts:

In August the weather on the North Atlantic Ocean is, as a rule, settled. The more severe storms, which occur on an average of about once in two years, are of tropical or subtropical origin, and cross the Grand Banks, traveling in a northeasterly direction. This course carries them north of the transatlantic steamship routes to the west of the